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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/805,273	03/13/2001	Wenge Yang	9076/463	1234

7590                      09/22/2005

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EXAMINER	
ESTRADA, MICHELLE	

ART UNIT	PAPER NUMBER
2823	

DATE MAILED: 09/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	09/805,273	YANG, WENGE	
	<b>Examiner</b>	<b>Art Unit</b>	
	Michelle Estrada	2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 08 September 2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 27-55 is/are pending in the application.
- 4a) Of the above claim(s) 27-34 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 35-55 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 9/8/05 has been entered.

### **Claim Rejections - 35 USC § 103**

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 35, 38, 44, 50 and 52-55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mui et al. (6,037,265) in view of Applicant's Admitted Prior Art (AAPA).

With respect to claim 35, Mui et al. disclose depositing a conductive layer (22) upon a substrate (14); depositing a conductive adhesive layer (16) between said substrate and said conductive layer, wherein said conductive adhesive layer has a minimum thickness required to provide adhesion between said substrate and said conductive layer for a robust structure that can withstand subsequent processing,

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furthermore, Mui et al. disclose that the thickness of the conductive adhesive layer would depend upon the end use of the semiconductor, which is to contain layer (16) (Col. 6, lines 6-10); and etching a portion of said conductive layer and a portion of said conductive adhesive layer utilizing a plasma (Fig. 5) without sacrificing said substrate, wherein said plasma comprises an etchant, wherein said etchant comprises chlorine, wherein said plasma is ionized and sustained by a first RF source (78), and wherein said plasma is accelerated by a second RF source (84) (Col. 8, lines 4-15 and Col. 10, lines 28-33).

Mui et al. do not disclose that the substrate comprises a silicon oxide-silicon nitride-silicon oxide (ONO) layer.

AAPA disclose depositing a tungsten or tungsten silicide layer (101) over a layer of polysilicon (102), which was previously deposited on the substrate (103); wherein the substrate could be an oxide, for example silicon oxide-silicon nitride-silicon oxide (ONO).

It would have been within the scope of one of ordinary skill in the art to combine the teachings of Mui et al. and AAPA to enable the ONO substrate material of AAPA to be used in the process of Mui et al. because one of ordinary skill in the art would have been motivated to look to alternative suitable materials to be used in the disclosed oxide substrate material of Mui et al. and art recognized suitability for an intended purpose has been recognized to be motivation to combine. See MPEP 2144.07. Furthermore, silicon oxide-silicon nitride-silicon oxide layer (ONO) forms a good bond with the polysilicon adhesive layer.

One of ordinary skill in the art would have been led to the recited conductive adhesive thickness through routine experimentation to achieve a desired device dimension, device associated characteristics and device density on the finished wafer. See MPEP 2144.05. In addition, the selection of conductive adhesive thickness, it's obvious because it is a matter of determining optimum process conditions by routine experimentation with a limited number of species of result effective variables. These claims are prima facie obvious without showing that the claimed ranges achieve unexpected results relative to the prior art range. In re Woodruff, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also In re Huang, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996)(claimed ranges or a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also In re Boesch, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill or art) and In re Aller, 105 USPQ 233 (CCPA 1995) (selection of optimum ranges within prior art general conditions is obvious).

Note that the specification contains no disclosure of either the critical nature of the claimed conductive adhesive thickness or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen conductive adhesive thickness or upon another variable recited in a claim, the Applicant must show that the chosen conductive adhesive thickness are critical. In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

With respect to claim 38, Mui et al. disclose wherein the adhesive layer comprises polysilicon (Col. 5, line 30); and said conductive layer comprises tungsten silicide (Col. 5, line 32).

With respect to claim 44, Mui et al. disclose depositing a conductive adhesive layer (16) upon a substrate (14), wherein said substrate comprises silicon oxide (Col. 5, lines 44-45); depositing a conductive layer (22) on said conductive adhesive layer, wherein said conductive layer comprises tungsten silicide (Col. 6, line 16) and wherein said conductive adhesive layer adheres said conductive layer to said substrate; forming a bit line gate by selectively etching a portion of said conductive layer and a portion of said conductive adhesive layer without sacrificing said substrate (See fig.5) utilizing a plasma, wherein said plasma comprises chlorine (Col. 8, lines 4-15 and Col. 10, lines 28-33), wherein an ion flux of said plasma is a function of a first power source (78) (Col. 11, lines 20-25), and wherein an energy of said plasma is a function of a second power source (84).

One of ordinary skill in the art would have been led to the recited conductive adhesive thickness through routine experimentation to achieve a desired device dimension, device associated characteristics and device density on the finished wafer. See MPEP 2144.05. In addition, the selection of conductive adhesive thickness, it's obvious because it is a matter of determining optimum process conditions by routine experimentation with a limited number of species of result effective variables. These claims are prima facie obvious without showing that the claimed ranges achieve unexpected results relative to the prior art range. In re Woodruff, 16 USPQ2d 1935,

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1937 (Fed. Cir. 1990). See also *In re Huang*, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996)(claimed ranges or a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also *In re Boesch*, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill or art) and *In re Aller*, 105 USPQ 233 (CCPA 1995) (selection of optimum ranges within prior art general conditions is obvious).

Note that the specification contains no disclosure of either the critical nature of the claimed conductive adhesive thickness or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen conductive adhesive thickness or upon another variable recited in a claim, the Applicant must show that the chosen conductive adhesive thickness are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

With respect to claim 50, Mui et al. disclose wherein the adhesive layer comprises polysilicon (Col. 5, line 30).

With respect to claim 52, Mui et al. disclose depositing a polysilicon layer (16) upon an oxide substrate (14); depositing a conductive layer (22) on said polysilicon layer, wherein said conductive layer comprises tungsten silicide (Col. 6, line 16) and wherein said polysilicon layer has a thickness of at least 300 angstroms, which overlaps with the recited thickness (500 angstroms) to provide adhesion between said substrate

and said conductive layer for a robust structure that can withstand subsequent processing, furthermore, Mui et al. disclose that the thickness of the conductive adhesive layer would depend upon the end use of the semiconductor, which is to contain layer (16) (Col. 6, lines 6-10); and selectively etching said conductive layer and said polysilicon layer without sacrificing said oxide substrate, to form said electrical connection on said oxide layer, utilizing a decoupled plasma (Fig. 5 and Col. 10, lines 12-15), wherein said plasma comprises chlorine gas and oxygen gas (Col. 8, lines 28-32), wherein said plasma is ionized and sustained by an RF flux power source (78), and wherein said plasma is accelerated by an RF bias power source (84) (Col. 8, lines 4-15 and Col. 10, lines 28-33).

Mui et al. do not disclose wherein the oxide substrate comprises specifically a silicon oxide-silicon nitride-silicon oxide (ONO) layer.

AAPA disclose depositing a tungsten or tungsten silicide layer (101) over a layer of polysilicon (102), which was previously deposited on the substrate (103); wherein the substrate could be an oxide, for example silicon oxide-silicon nitride-silicon oxide (ONO).

It would have been within the scope of one of ordinary skill in the art to combine the teachings of Mui et al. and AAPA to enable the ONO substrate material of AAPA to be used in the process of Mui et al. because one of ordinary skill in the art would have been motivated to look to alternative suitable materials to be used in the disclosed oxide substrate material of Mui et al. and art recognized suitability for an intended purpose has been recognized to be motivation to combine. See MPEP 2144.07. Furthermore,



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silicon oxide-silicon nitride-silicon oxide layer (ONO) forms a good bond with the polysilicon adhesive layer.

One of ordinary skill in the art would have been led to the recited conductive adhesive thickness through routine experimentation to achieve a desired device dimension, device associated characteristics and device density on the finished wafer. See MPEP 2144.05. In addition, the selection of conductive adhesive thickness, it's obvious because it is a matter of determining optimum process conditions by routine experimentation with a limited number of species of result effective variables. These claims are prima facie obvious without showing that the claimed ranges achieve unexpected results relative to the prior art range. In re Woodruff, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also In re Huang, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996)(claimed ranges or a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also In re Boesch, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill or art) and In re Aller, 105 USPQ 233 (CCPA 1995) (selection of optimum ranges within prior art general conditions is obvious).

Note that the specification contains no disclosure of either the critical nature of the claimed conductive adhesive thickness or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen conductive adhesive thickness or upon another variable recited in a claim, the Applicant must show that the

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chosen conductive adhesive thickness are critical. In re Woodruf, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

With respect to claim 53, Mui et al. disclose wherein said selectively etching is conducted at a pressure of approximately 0.5 mTorr to 50 mTorr, which overlaps the recited range of claim 53 (2-4 mTorr).

With respect to claim 54, Mui et al. disclose wherein a flow rate of said chlorine is approximately 40 to 140 sccm, which overlaps the recited range of claim 54 (40-100 sccm); and a flow rate of said oxygen is approximately 4 to 70 sccm, which overlaps the recited range of claim 54 (4-12 sccm).

With respect to claim 55, Mui et al. disclose wherein said RF flux power source is approximately 200 to 1200 watts, which overlaps the recited range of claim 55 (800-1500 watts); and said RF bias power source is approximately 30 to 300 watts (preferred) and 30-100(optimum), which overlaps the recited range of claim 55 (50-150 watts).

Claims 36, 37, 39-43 and 45-49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mui et al. in view of AAPA as applied to claims 35, 38, 44 and 50 above, and further in view of the following comments.

Mui et al. do not specifically disclose wherein said conductive adhesive layer has a thickness of approximately 10 to 500 angstroms; wherein said conductive layer and

said conductive adhesive layer have a combined thickness of approximately 3000 angstroms or less.

With respect to claim 36, Mui et al. disclose wherein said conductive adhesive layer (16) has a thickness typically from 300 Å to about 8000 Å, the thickness of (16) would depend upon the end use of the semiconductor, which is to contain layer (16) (Col. 6, lines 6-10). Mui et al. disclose a thickness range that overlaps the thickness range recited in claim 36 (10 to 500 angstroms).

With respect to claim 37, Mui et al. disclose wherein said conductive layer and said adhesive layer could have a combined thickness of approximately 3000 angstroms or less, this would depend on the thickness chosen for the polysilicon layer and the conductive layer.

With respect to claim 39, Mui et al. disclose wherein said etching is conducted at a pressure of approximately 0.5 mTorr to 50 mTorr, which overlaps the recited range of claim 39 (2-4 mTorr).

With respect to claim 40, Mui et al. disclose wherein a flow rate of said chlorine is approximately 40 to 140 sccm, which overlaps the recited range of claim 40 (40-100 sccm).

With respect to claim 41, Mui et al. disclose wherein a flow rate of said oxygen is approximately 4 to 70 sccm, which overlaps the recited range of claim 41 (4-12 sccm).

With respect to claim 42, Mui et al. disclose wherein said first RF source is approximately 200 to 1200 watts, which overlaps the recited range of claim 42 (800-1500 watts).

With respect to claim 43, Mui et al. disclose wherein said second RF source is approximately 30 to 300 watts (preferred) and 30-100(optimum), which overlaps the recited range of claim 43 (50-150 watts).

With respect to claim 45, Mui et al. disclose wherein said etching is conducted at a pressure of approximately 0.5 mTorr to 50 mTorr, which overlaps the recited range of claim 45 (2-4 mTorr).

With respect to claim 46, Mui et al. disclose wherein a flow rate of said chlorine is approximately 40 to 140 sccm, which overlaps the recited range of claim 46 (40-100 sccm).

With respect to claim 47, Mui et al. disclose wherein a flow rate of said oxygen is approximately 4 to 70 sccm, which overlaps the recited range of claim 47 (4-12 sccm).

With respect to claim 48, Mui et al. disclose wherein said first RF source is approximately 200 to 1200 watts, which overlaps the recited range of claim 48 (800-1500 watts).

With respect to claim 49, Mui et al. disclose wherein said second RF source is approximately 30 to 300 watts (preferred) and 30-100(optimum), which overlaps the recited range of claim 49 (50-150 watts).

With respect to claim 51, Mui et al. disclose wherein said conductive layer has a thickness of preferably 500 to 2400 angstroms and most preferably 800 to 2000 angstroms, which overlaps the recited range of claim 51 (1500-2500 angstroms).

***Response to Arguments***

Applicant's arguments filed 9/12/05 have been fully considered but they are not persuasive.

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, motivation was provided in the Office Action mailed 6/14/05.

Applicant argues that Mui et al. teaches away from the fourth plasma etchant comprising a halogen, carbon monoxide and oxygen. This argument is respectfully traversed because these plasma etchants are taught as another preferred embodiment. Mui et al. teaches this embodiment nonetheless, and disclosed examples and preferred embodiments do not constitute a teaching away from a broader disclosure or nonpreferred embodiments. In re Susi, 169 USPQ 423 (CCPA 1971). "A known or obvious composition does not become patentable simply because it has been described as somewhat inferior to some other product for the same use." In re Gurley, 31 USPQ2d 1130, 1132 (Fed. Cir. 1994). A reference may be relied upon for all that it would have reasonably suggested to one having ordinary skill in the art, including nonpreferred embodiments. Merck & Co. v. Biocraft Laboratories, 874 F.2d 804, 10

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USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989). Even a teaching away from a claimed invention does not render the invention patentable. See *Celeritas Technologies Ltd. v. Rockwell International Corp.*, 150 F.3d 1354, 1361, 47 USPQ2d 1516, 1522-23 (Fed. Cir. 1998), where the court held that the prior art anticipated the claims even though it taught away from the claimed invention. "The fact that a modem with a single carrier data signal is shown to be less than optimal does not vitiate the fact that it is disclosed." To further clarify, a prior art opinion that a claimed invention is not preferred for a particular limited purpose, does not preclude utility of the invention for that or another purpose, or even preferability of the invention. This is not a "teaching away" case, *Mui et al.* is "teaching another way", and even using this "another preferred embodiment" in the Examples. The allegation that it causes microtrenching is not a reason for "teaching away" from the invention.

Applicant argues that in Examples V and VI, the etching of the WSi layer and the polysilicon layer formed on a gate oxide layer resulted in erosion of the gate oxide layer (or substrate); and claim 35 is directed to etching a portion of the conductive layer and a portion of the conductive adhesive layer utilizing a plasma without sacrificing the substrate. However, this erosion occurs only on Examples V and VI. It does not occur in Example II, where *Mui et al.* uses chlorine and oxygen.

Applicant argues that *Mui* teaches away from a conductive adhesive layer that has a thickness that is less than 300 angstroms. However, Applicant is directed to the Office Action mailed 6/14/05, where it is explained that thickness is a result effective variable. One of ordinary skill in the art would have been led to the recited conductive

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adhesive thickness through routine experimentation to achieve a desired device dimension, device associated characteristics and device density on the finished wafer.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Estrada whose telephone number is 571-272-1858. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith can be reached on 571-272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 571-272-2800.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Michelle Estrada  
Patent Examiner  
Art Unit 2823

ME  
September 15, 2005